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U. S. DEPARTMENT OF AGRICULTURE FOREST SERVICE FOREST PRODUCTS LABORATORY MADISON, WIS.

In Cooperation with the University of Wisconsin

LIST OF PUBLICATIONS ON ***DRYING OF WOOD***

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This list includes publications that present the results of research by the Forest Products Laboratory in this particular field of wood products research.

Single copies of the various items may be obtained free upon request from the Director, Forest Products Laboratory, Post Office Box 5130, Madison, WI 53705. Classroom quantities are not available because of limited printing and storage facilities.

Title	Author	Publication and date
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PHYSICAL PROPERTIES OF WOOD RELATED TO DRYING

A. Permeability and Diffusion

Directional permeability of softwoods.	: Comstock, G. L. : Wood and Fiber 1(4):	: 283-289. 1970.
	:	:
Relationship between permeability of green and dry eastern hemlock.	: Comstock, G. L. : Forest Prod. J. 18(8):	: 20-23. Aug. 1968.
	:	:

Title	:	Author	:	Publication and date
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A. Permeability and Diffusion--Continued

Factors affecting permeability and pit aspiration in coniferous sapwood.	:	Comstock, G. L., & Cote, W. A.	:	Wood Sci. and Tech. 2: 279-291. 1968.
	:		:	
Longitudinal permeability of green eastern hemlock.	:	Comstock, G. L.	:	Forest Prod. J. 15(10): 441-449. Oct. 1965.
	:		:	
Moisture diffusion coefficients in wood as calculated from adsorption, desorption, and steady state data.	:	Comstock, G. L.	:	Forest Prod. J. 13(5): 97-103. Mar. 1963.
	:		:	

B. Shrinkage and Swelling

Longitudinal shrinkage in seven species of wood.	:	Hann, R. A.	:	U.S. Forest Serv. Res. Note FPL-0203. 1969.
	:		:	
Effect of restrained swelling on wood moisture content.	:	Simpson, W. T., & Skaar, C.	:	U.S. Forest Serv. Res. Note FPL-0196. 1968.
	:		:	
Effect of transverse compressive stress on loss of wood moisture.	:	Simpson, W. T., & Skaar, C.	:	U.S. Forest Serv. Res. Note FPL-0197. 1968.
	:		:	
Thermodynamics of water sorption by wood.	:	Skaar, C., & Simpson, W. T.	:	Forest Prod. J. 18(7): 49-58. July 1968.
	:		:	
Dimensional changes in kiln-dried softwood lumber after surfacing and during storage.	:	Comstock, G. L.	:	U.S. Forest Serv. Res. Note FPL-0144. 1966.
	:		:	
Shrinkage of coast-type Douglas-fir and old-growth redwood boards.	:	Comstock, G. L.	:	U.S. Forest Serv. Res. Pap. FPL 30. 1965.
	:		:	

Title	Author	Publication and Date
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<u>C. Moisture Content</u>		
List of manufacturers and dealers handling apparatus for determining moisture content of wood.	:	: FPL Rep. 69-009. : 1969.
Effect of temperature on readings of electric moisture meters.	: James, W. L.	: Forest Prod. J. 18(10): : 23-31. Oct. 1968.
Effects of wood preservatives on electrical moisture meter readings.	: James, W. L.	: U.S. Forest Serv. Res. : Note FPL-0106. 1966.
A probe for accurate determination of moisture content of wood products in use.	: Duff, John E.	: U.S. Forest Serv. Res. : Note FPL-0142. 1966.
Calibration of electric moisture meters for some wood species grown in Hawaii.	: James, W. L.	: U.S. Forest Serv. Res. : Note FPL-061. 1964.
Electric moisture meters for wood.	: James, W. L.	: U.S. Forest Serv. Res. : Note FPL-08. 1963.
Kiln Samples (Chap. 6, Dry Kiln Operator's Manual)	:	: (See Kiln Drying of : Lumber)
Wood Properties in relation to drying. (Chap. 2, Air Drying of Lumber.)	:	: (See Air Drying Treat- : ments)

D. Stresses

Transverse strain during drying of 2-inch ponderosa pine.	: McMillen, J. M.	: U.S. Forest Serv. Res. : Pap. FPL 83. 1968.
Tensile, compressive, and shearing stresses developed in red oak as it dries.	: Youngs, R. L., & Bendtsen, B. A.	: Forest Prod. J. 14(3): : 113-118. Mar. 1964.

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D. Stresses--Continued

Detection and relief of case-hardening and final moisture content tests in kiln-dried lumber.	:	: FPL Tech. Note 213. : Reissued 1962.
Method of calculating shrinkage or swelling of wood with change in moisture content.	: Peck, E. C.	: FPL Rep. 1769-27. : 1960.
Stresses in drying lumber.	: McMillen, J. M. : & Youngs, R. L.	: So. Lbrmn. 201 : (2513): 115-119. : Dec. 15, 1960.

E. Other Problems Related to Drying

Gray-brown chemical stain in southern hardwoods.	: Bois, P. J.	: U.S. Forest Serv. FPU : Tech. Rep. No. 1. : 1970.
Prevention of pinkish-brown discoloration in drying maple sapwood.	: McMillen, J. M.	: U.S. Forest Serv. Res. : Note FPL-0193. : 1968.
Standard terms for describing wood.	:	: U.S. Forest Serv. Res. : Note FPL-0171. 1967.
Comparative strength of air-dried and kiln-dried wood.	:	: U.S. Forest Serv. Res. : Note FPL-055. 1964.
Characteristics of Alaska wood.	:	: U.S. Forest Serv. Res. : Pap. FPL 1. 1963.
Effects of tension wood in hardwood lumber and veneer.	: Pillow, M. Y.	: FPL Rep. 1943. 1953. : +1962.
Computed thermal conductivity of common woods.	:	: FPL Tech. Note 248. : 1952.

+Information reviewed and reaffirmed.

Title	Author	Publication and date
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E. Other Problems Related to Drying--Continued

List of manufacturers and dealers:		: FPL Rep. 71-021.
for log and lumber end coatings :		: 1971.
that reduce checking and :		:
splitting. :		:
		:
Dip treatment in polyethylene :	Rietz, R. C.	: U.S. Forest Serv. Res.
glycol not effective in :		: Note FPL-0204.
preventing surface checking. :		: 1969.
		:
U.S. Forest Products Laboratory :		: U.S. Forest Serv. Res.
notes on the treatment of wood :		: Note FPL-06. 1966.
with polyethylene glycol. :		:
		:
Protect imported carvings with :	Mitchell, H. L., &	: Forest Prod. J. 12(10):
PEG. :	Fobes, E. W.	: 476-477. Oct. 1962.
		:
Seasoning green-wood carvings :	Mitchell, H. L., &	: Forest Prod. J. 11(1):
with polyethylene glycol-1000. :	Iversen, E. S.	: 6-7. Jan. 1961.
		:
Coatings for the prevention of end :	McMillen, J. M.	: FPL Rep. 1435. 1943.
checks in logs and lumber. :		: +1961.

VARIOUS METHODS OF DRYING LUMBER

Air Drying

Air drying of lumber: A guide	: Rietz, R. C., &	: USDA Agr. Hdbk. No.
to industry practices.	: Page, H.	: 402. 110 pp. 1971.
	:	: (Copies may be pur-
	:	: chased from the
	:	: Superintendent of
	:	: Documents, GPO,
	:	: Washington, D.C.,
	:	: 20402. Price - \$1.00
	:	:
Air-drying lumber in stickered	: Rietz, R. C.	: So. Lbrmn. 221(2752):
packages.	:	: 99-103. Dec. 15, 1970.
	:	:
Air drying lumber in a forklift	: Rietz, R. C.	: U.S. Forest Serv. Res.
yard.	:	: Note FPL-0209. 1970.

+Information reviewed and reaffirmed.

Title	Author	Publication and date
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Air Drying--Continued

The air-drying of southern hardwoods.	Rietz, R. C.	So. Lbrmn. 210(2617): 19-20. May 1, 1965.
A method of seasoning small quantities of lumber.	Rasmussen, E. F.	U.S. Forest Serv. Res. Note FPL-089. 1965.
Lumber seasoning: An operation manual for cooperative program use.	Peck, E. C., & McMillen, J. M.	U.S. I. C. A. Tech. Aids Br. 1961. (Also: Secado de Madera, a Spanish language trans. Mexico City. 1962.)
Air-drying of 4/4 red oak in southern Wisconsin.	Peck, E. C.	Forest Prod. J. 9(7): 197-203. July 1959.
Air-drying and sticker staining of 4/4 sugar maple flooring in Upper Michigan.	Peck, E. C.	FPL Rep. 2086. 1957. +1963.

KILN DRYING OF LUMBER

Schedules for foreign woods.	McMillen, J. M., & Bois, P. J.	U.S. Forest Serv. FPU Tech. Rep. No. 2. March 1972.
Accelerated oak drying by pre-surfacing, accelerated schedules, and kiln automation.	Wengert, E. M., & Baltes, R. C.	U.S. Forest Serv. Res. Note FPL-0214. 1971.
Dry kiln automation.	Wengert, E. M.	So. Lbrmn. Dec. 15, 1971.
Automatic programming and control for steam-heated lumber dry kilns.	Wengert, E. M., & Evans, P. G.	Forest Prod. J. 21(2): 56-59, 1971.
Improvements in solar dry kiln design.	Wengert, E. M.	U.S. Forest Serv. Res. Note FPL-0212. 1971.
Partial list of lumber dry kiln manufacturers in the United States.		FPL Rep. 71-014. 1971.

+Information reviewed and reaffirmed.

Title	Author	Publication and Date
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<u>KILN DRYING OF LUMBER--Continued</u>		
Accelerating the kiln drying of hardwoods.	Rietz, R. C.	So. Lbrmn. 221(2741): 19-22, 26, 27, 30. July 1, 1970.
Properties of imported tropical woods. (Kiln schedules included.)	Kukachka, B. F.	U.S. Forest Serv. Res. Pap. FPL 125. 1970.
Accelerated kiln drying of pre-surfaced 1-inch northern red oak.	McMillen, J. M.	U.S. Forest Serv. Res. Pap. FPL 122. 1969.
Influence of initial drying temperatures on the development of warp in 1-inch hard maple.	Rietz, R. C.	Forest Prod. J. 19(7): 37-40. July 1969.
Producing check-free beech for turnings.	Rietz, R. C., & Jenson, J. A.	Forest Prod. J. 18(11): 42-44. Nov. 1968.
Seasoning and handling of ramin.	McMillen, J. M.	U.S. Forest Serv. Res. Note FPL-0172. 1967.
Operation and maintenance of lumber dry kilns.		U.S. Forest Serv. Res. Note FPL-0118. 1966.
News and views of this kiln drying business: Presurfacing green oak lumber to reduce surface checking.	Rietz, R. C., & Jenson, J. A.	U.S. Forest Serv. Res. Note FPL-0146. 1966.
News and views of this kiln drying business: Warp reduction.		U.S. Forest Serv. Res. Note FPL-0108. 1965.
Comparative strength of air-dried and kiln-dried wood.		U.S. Forest Serv. Res. Note FPL-055. 1964.
Drying by solar radiation in Puerto Rica.	Maldonado, E. D., & & Peck, E. C.	Forest Prod. J. 12(10): 487-488. Oct. 1962.

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KILN DRYING OF LUMBER--Continued

Dry kiln operator's manual.	:	Rasmussen, E. F.:	Agr. Hdbk. No. 188.
	:		: 1961. (Copies may be
	:		: obtained from the
	:		: Superintendent of
	:		: Documents, GPO,
	:		: Washington, D.C.
	:		: 20402 (Price - \$1.50)
	:		:
Separates from Dry Kiln	:		: Agr. Hdbk. No. 188.
Operator's Manual.	:		: 1961. Individual copies
<u>Chapter</u>	:		: of separates available
	:		: from Forest Products
Introduction	:		: Laboratory.
1. Properties of wood related to	:		:
drying.	:		:
2. Kiln types and features.	:		:
3. Auxiliary kiln equipment.	:		:
4. Inspection and maintenance	:		:
of dry kilns.	:		:
5. Stacking lumber and other	:		:
items for kiln drying.	:		:
6. Kiln samples.	:		:
7. Loading the dry kiln.	:		:
8. Kiln schedules and drying	:		:
time.	:		:
9. Drying defects.	:		:
10. Operating a dry kiln.	:		:
11. Storage of wood.	:		:
	:		:
News and views of this kiln	:	Rietz, R. C.	: Wood. Nov. 1955.
drying business: What are the	:		: FPL Rep. 1769-7. 1955.
advantages and disadvantages	:		: +1960.
of the package-loaded dry kiln?	:		:
	:		:
What are some of the advan-	:	Rietz, R. C.	: Wood. Jan. 1951.
tages and disadvantages of	:		: FPL Rep. 1769-8. 1951.
package-loaded kiln trucks?	:		: +1960.

+Information reviewed and reaffirmed.

Title	Author	Publication and date
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KILN DRYING OF LUMBER--Continued

Can American elm be dried without excessive warping?	McMillen, J. M.	FPL Rep. 1769-26. 1960.
Relative humidity and equilibrium moisture content graphs and tables for use in kiln drying lumber.		FPL Rep. 1651. +1963.

SPECIAL DRYING METHODS

Press drying nine species of wood.	Hittmeier, M. E., Comstock, G. L., & Hann, R. A.	Forest Prod. J. 18(9): 91-96. Sept. 1968.
High-temperature drying of lumber--a review.	Lowery, D. P., Krier, J. P., & Hann, R. A.	U.S. Forest Serv. Res. Pap. INT 48. 1968.
Quality of studs kiln dried by high and conventional temperatures.	Kimball, K. E., & Lowery, D. P.	Forest Prod. J. 17(9): 81-85. Sept. 1967.
High temperature and conventional temperature methods for drying lodgepole pine and western larch studs.	Kimball, K. E., & Lowery, D. P.	Forest Prod. J. 17(4): 32-40. Apr. 1967.
Solar drying of tropical woods.	Chudnoff, M., Maldonado, E. D., & Goytia, E.	U.S. Forest Serv. Res. Pap. ITF 2. 1966.
Paneling and flooring from low-grade hardwood logs. (Press-dried paneling.)	Heebink, B. G., & Compton, K. C.	U.S. Forest Serv. Res. Note FPL-0122. 1966.
Drying 4/4 red oak by solar heat.	Peck, E. C.	Forest Prod. J. 12(3): 103-107. Mar. 1962.
Special methods of seasoning wood.		
Boiling in oily liquids.	McMillen, J. M.	FPL Rep. 1669. Rev. 1961.

+Information reviewed and reaffirmed.

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SPECIAL DRYING METHODS--Continued

Solvent seasoning.	:	McMillen, J. M.	:	FPL Rep. 1665-2.
	:		:	Rev. 1961.
	:		:	
High-frequency dielectric heating.	:	McMillen, J. M.	:	FPL Rep. 1665-7.
	:	& James, W. L.	:	Rev. 1961.
	:		:	
Kiln schedules for Puerto Rican yagrumo hembra.	:	McMillen, J. M.	:	Carib. Forest.
	:		:	July - Dec. 1961.
	:		:	
Veneer cutting and drying properties:	:		:	
Water oak.	:		:	U.S. Forest Serv. Res.
	:		:	Note FPL-0105. 1965.
Cottonwood.	:		:	U.S. Forest Serv. Res.
	:		:	Note FPL-044. 1964.
Western larch.	:		:	U.S. Forest Serv. Res.
	:		:	Note FPL-0163. 1967.
Western hemlock.	:		:	FPL Rep. 1766-7. 1951.
	:		:	+1960.
Redwood.	:		:	FPL Rep. 1766-8.
	:		:	Rev. 1959.
Tupelo.	:		:	U.S. Forest Serv. Res.
	:		:	Note FPL-017. 1963.
Ponderosa pine.	:		:	FPL Rep. 1766-12.
	:		:	1956. +1962.
Aspen and hybrid poplar.	:		:	FPL Rep. 1766-13.
	:		:	1957. +1963.
Pacific madrone.	:		:	U.S. Forest Serv. Res.
	:		:	Note FPL-094. 1965.
Tanoak.	:		:	U.S. Forest Serv. Res.
	:		:	Note FPL-0164. 1967.
Tamarack.	:		:	FPL Rep. 1766-16.
	:		:	1961.
	:		:	
Causes and control of end waviness during drying of veneer.	:	Lutz, J. F.	:	Forest Prod. J. 5(2):
	:		:	114-117. Apr. 1955.
	:		:	
	:		:	
Hickory for veneer and plywood.	:	Lutz, J. F.	:	Hickory Task Force Rep.
	:		:	No. 1. 1955. SE.
	:		:	Forest Exp. Sta.,
	:		:	Forest Serv., USDA,
	:		:	Asheville, N. C. 28802.

+Information reviewed and reaffirmed.

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SPECIAL DRYING METHODS--Continued

Veneer flooring.	: Heebink, B. G.	: Forest Prod. J. 2(3):
	:	: 138-140. Sept. 1952.

MOISTURE CONTENT AND TEMPERATURE CONTROL
DURING FABRICATION AND USE

Equilibrium moisture prediction for wood.	: Simpson, W. T.	: Forest Prod. J. 21(5):
	:	: 48. May 1971.
Moisture content of laminated timbers.	: Hann, R. A.,	: U.S. Forest Serv. Res.
	: Oviatt, A. E.,	: Pap. FPL 149.
	: Markstrom, D. M.,	: 1970.
	: & Duff, J. E.	:
Electrical analog approach to heat flow through wood-frame walls.	: Wengert, E. M.	: Forest Prod. J. 18(1):
	:	: 99-101. Jan. 1968.
Drying and conditioning glued joints.	:	: U.S. Forest Serv. Res.
	:	: Note FPL-0190. 1968.
Moisture distribution in wood-frame walls in winter.	: Duff, J. E.	: Forest Prod. J. 18(1):
	:	: pp. 60-64. Jan. 1968.
An analog computer for predicting surface temperature of wood.	: Wengert, E. M.	: U.S. Forest Serv. Res.
	:	: Note FPL-0171.
	:	: Aug. 1967.
Parameters for predicting maximum surface temperatures of wood in exterior exposures.	: Wengert, E. M.	: U.S. Forest Serv. Res.
	:	: Pap. FPL 62.
	:	: May 1966.
Make your own low-cost controlled-humidity room.	: Heebink, B. G.	: Plywood Mag. Mid-
	:	: February 1964.
	:	: pp. 24-26.
Predicting maximum surface temperatures of wood in exterior exposures.	: Wengert, E. M.	: Forest Prod. J. 15(7):
	:	: 263-268. July 1965.
Study of temperatures in wood parts of houses throughout the United States.	: Heyer, O. C.	: U.S. Forest Serv. Res.
	:	: Note FPL-012. 1963.

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MOISTURE CONTENT AND TEMPERATURE CONTROL
DURING FABRICATION AND USE--Continued

Storage of wood.	:	Rasmussen, E. F.:	Separate Chapter 11
	:		from "Dry Kiln
	:		Operator's Manual,"
	:		Agr. Hdbk. No. 188.
	:		1961.
How wrapping keeps wood parts	:	Mathewson, J. S.	Wood and Wood Prod.
stable.	:		60(8): 26. Aug. 1955.
Moisture content of wood in use.	:	Peck, E. C.	FPL Rep. 1655. 1947.
	:		+1961.

RELATED PUBLICATIONS

Wood drying--techniques and	:	McMillen, J. M.	So. Lbrmn. 208(2589):
economics.	:		25-26, 28, 32, 34.
	:		Feb. 15, 1964.
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+Information reviewed and reaffirmed.